

What is claimed is:

1. A document image processing device,
comprising:

5 character region extracting unit extracting
character regions respectively from a plurality of
document images which are partitioned and read;

character recognizing unit recognizing character
images within the character regions extracted by said
10 character region extracting unit;

overlapping detecting unit detecting an
overlapping of the plurality of document images based
on character recognition results of the respective
document images, which are obtained by said character
15 recognizing unit; and

image merging unit merging the plurality of
document images at an overlapping position detected
by said overlapping detecting unit.

20 2. A document image processing device,
comprising:

character region extracting unit extracting
character regions respectively from a plurality of
document images which are partitioned and read;

25 overlapping detecting unit detecting character

regions whose matching degrees are high by making a comparison between positions and sizes of the respective character regions extracted by said character region extracting unit, and detecting an overlapping of the plurality of document images based on positions of the detected character regions whose matching degrees are high; and

5 image merging unit merging the plurality of document images at an overlapping position detected by said overlapping detecting unit.

10 3. A document image processing device, comprising:

character region extracting unit extracting character regions respectively from a plurality of document images which are partitioned and read;

character recognizing unit recognizing character images within the character regions extracted by said character region extracting unit;

20 overlapping detecting unit detecting an overlapping of the plurality of document images based on character recognition results of the respective document images, which are obtained by said character recognizing unit, and on a result of a comparison
25 between positions and sizes of the respective

character regions in the plurality of document images,
which are extracted by said character region
extracting unit; and

5 image merging unit merging the plurality of
document images at an overlapping position detected
by said overlapping detecting unit

4. The document image processing device
according to claim 1, wherein said character region
10 extracting unit extracts a plurality of character
regions in line images in the plurality of document
images.

5. The document image processing device
15 according to claim 1, wherein said overlapping
detecting unit detects as an overlapping position of
line images whose matching degrees are high by making
a comparison between character regions in line images
in a direction from edges of the plurality of document
20 images to their centers.

6. The document image processing device
according to claim 1, wherein:
the plurality of document images which are
25 partitioned and read are two document images; and

said overlapping detecting unit detects an overlapping position of the two document images by making a comparison between character regions in line images in the two document images.

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7. The document image processing device according to claim 1, wherein said overlapping detecting unit regards as detection targets character regions in particular regions in the plurality of document images.

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8. The document image processing device according to claim 1, wherein said overlapping detecting unit detects an overlapping position sequentially from a direction with a higher priority among a plurality of detection directions.

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9. The document image processing device according to claim 8, wherein said overlapping detecting unit determines an overlapping position detection direction depending on whether or not the document images are written either vertically or horizontally.

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10. The document image processing device

according to claim 1, wherein said overlapping detecting unit detects an overlapping position only in a particular direction.

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5 11. The document image processing device according to claim 1, wherein said character region extracting unit extracts a region enclosed by a tetragon circumscribed to a character image as a character region.

10 12. A document image merging method, comprising:
recognizing character images;
detecting an overlapping of the plurality of document images based on character recognition results
15 of the respective document images which are partitioned and read; and
merging the plurality of document images at a detected overlapping position.

20 13. A document image merging method, comprising:
detecting a plurality of character regions whose matching degrees are high by making a comparison between positions and sizes of the respective character regions in the respective document images;
25 detecting an overlapping of the plurality of

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document images based on positions of the plurality of character regions whose matching degrees are high; and

merging the plurality of document images at a detected overlapping position.

14. A document image merging method, comprising: recognizing character images;

detecting an overlapping of the plurality of document images based on character recognition results of the respective document images, and on a result of a comparison between positions and sizes of the respective character regions in the plurality of document images; and

merging the plurality of document images at a detected overlapping position.

15. A document image processing device, comprising:

region partitioning unit partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;

line image extracting unit extracting line images

respectively from the plurality of regions partitioned
by said region partitioning unit;

overlapping detecting unit detecting an
overlapping position of the plurality of document
5 images based on positions of character regions whose
matching degrees are high by making a comparison
between character regions in the line images in the
respective regions, which are extracted by said line
image extracting unit; and

10 image merging unit merging the plurality of
document images at the overlapping position detected
by said overlapping detecting unit.

16. A document image processing device,
15 comprising:

region partitioning unit partitioning an
arbitrary number of document images among a plurality
of document images which are partitioned and read, or
the respective document images into a plurality of
20 regions;

line image extracting unit extracting line images
respectively from the plurality of regions partitioned
by said region partitioning unit;

character recognizing unit recognizing character
25 images in the line images within the respective

regions, which are extracted by said line image extracting unit;

overlapping detecting unit detecting an overlapping position of the plurality of document images based on character recognition results of one or a plurality of regions in the respective document images, which are obtained by said character recognizing unit; and

image merging unit merging the plurality of document images at the overlapping position detected by said overlapping detecting unit.

17. A document image processing device, comprising:

region partitioning unit partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;

line image extracting unit extracting line images respectively from the plurality of regions partitioned by said region partitioning unit;

overlapping detecting unit detecting a plurality of character regions whose matching degrees are high by making a comparison between positions and sizes of

a plurality of character regions in the line images extracted by said line image extracting unit, and detecting an overlapping position of the plurality of document images based on the positions of the detected character regions; and

image merging unit merging the plurality of document images at the overlapping position detected by said overlapping detecting unit.

18. The document image processing device according to claim 15, wherein:

said region partitioning unit partitions the plurality of document images into a plurality of regions in a vertical and a horizontal direction; and

said line image extracting unit makes a comparison between the number of line images extracted from a region partitioned in the vertical direction in the plurality of document images and the number of line images extracted from a region partitioned in the horizontal direction, and recognizes a line image direction of a region including a larger number of line images as a line image direction of the plurality of document images.

19. The document image processing device

according to claim 15, wherein said line image extracting unit detects pixels for one pixel line in a partitioned region, and detects pixel lines including a predetermined or larger number of black pixels as black pixel lines, and other lines as white pixel lines.

20. The document image processing device according to claim 19, wherein said line image extracting unit detects pixels in the partitioned regions in line units in a direction vertical to a partitioning bar of the regions partitioned by said region partitioning unit.

21. The document image processing device according to claim 19, wherein said line image extracting unit extracts as a black pixel region a region where the number of successive black pixel lines is within a predetermined range.

22. The document image processing device according to claim 21, wherein said line image extracting unit extracts as a white pixel region a region where the number of successive white pixel lines is equal to or larger than a predetermined

value.

23. The document image processing device according to claim 15, wherein said region partitioning unit changes a partitioned region size depending on a resolution of a read document image.

24. The document image processing device according to claim 21, wherein said line image extracting unit changes the number of black pixel lines regarded as black pixel regions depending on a resolution of a read document image.

25. The document image processing device according to claim 21, wherein said line image extracting unit extracts a black pixel region adjacent a white pixel region satisfying a predetermined condition as a line image.

26. The document image processing device according to claim 18, wherein said overlapping detecting unit detects character regions whose matching degrees are high as an overlapping position by making a comparison between character regions in the line images in the plurality of partitioned

regions in the direction of the larger number of line images, which are extracted by said line image extracting unit.

5 27. The document image processing device according to claim 15, wherein said overlapping detecting unit stores a detection frequency of a line image which was previously detected as an overlapping position of a document image in correspondence with
10 identification information assigned to the line image, and detects an overlapping position by giving precedence to a line image with a high detection frequency.

15 28. The document image processing device according to claim 15, wherein said overlapping detecting unit makes a comparison between the line images in the respective regions in a predetermined order.

20 29. A document image processing device, comprising:
 region partitioning unit partitioning an arbitrary number of document images among a plurality
25 of document images which are partitioned and read, or

the respective document images into a plurality of regions;

line image extracting unit extracting line images respectively from the plurality of regions partitioned
5 by said region partitioning unit;

overlapping detecting unit detecting an overlapping position of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison
10 between character regions in the line images in the respective regions, which are extracted by said line image extracting unit;

image merging unit merging the plurality of document images at the overlapping position detected
15 by said overlapping detecting unit; and

setting unit allowing a setting of whether or not to automatically merge the plurality of document images on a display screen.

20 30. The document image processing device according to claim 29, wherein said setting unit is an operation button displayed on the display screen.

25 31. The document image processing device according to claim 29, wherein said setting unit with

which a user can set the number of merging sheets of document images.

32. A document image merging method, comprising:
5 partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;
extracting line images respectively from the
10 plurality of partitioned regions;
detecting an overlapping position of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison between character regions in the
15 line images in the respective regions; and
merging the plurality of document images at the detected overlapping position.

33. A document image merging method, comprising:
20 partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;
extracting line images respectively from the
25 plurality of partitioned regions;

recognizing character images in character regions within the extracted line images;

detecting an overlapping position of the plurality of document images based on character recognition results of the respective regions; and
5 merging the plurality of document images at the detected overlapping position.

34. A document image merging method, comprising:
10 partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;

extracting line images respectively from the plurality of partitioned regions;
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detecting an overlapping position of the plurality of document images based on positions of the extracted line image whose matching degrees are high; and

20 merging the plurality of document images at the detected overlapping position.

35. A document image merging method, comprising:
making a display to allow a setting of whether
25 or not to automatically merge a plurality of document

images which are partitioned and read on a display screen;

partitioning an arbitrary number of document images among the plurality of document images, or the
5 respective document images into a plurality of regions;

extracting line images respectively from the plurality of partitioned regions;

recognizing character images in character regions
10 within the extracted line images;

detecting an overlapping position of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison between character regions in the
15 line images in the respective regions; and

merging the plurality of document images at the detected overlapping position.

36. A computer-readable storage medium on which
20 is recorded a program for causing a computer to execute a document image merging process, said process comprising:

extracting character regions respectively from a plurality of document images which are partitioned
25 and read;

detecting character regions whose matching degrees are high by making a comparison between a plurality of character regions in the plurality of document images based on positions and sizes of the character regions, and detecting an overlapping position of the plurality of document images based on positions of the character regions whose matching degrees are high; and

merging the plurality of document images at the detected overlapping position.

37. A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

extracting character regions respectively from a plurality of document images which are partitioned and read;

recognizing character images within the extracted character regions;

detecting an overlapping position of the plurality of document images based on character recognition results of the respective document images and on a result of a comparison between positions and sizes of the plurality of character regions in the

plurality of document images; and

merging the plurality of document images at the detected overlapping position.

5 38. A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

10 partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;

 extracting line images respectively from the plurality of partitioned regions;

15 detecting an overlapping position of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison between character regions in the line images within the respective regions; and

20 merging the plurality of document images at the detected overlapping position.

25 39. A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process

comprising:

partitioning an arbitrary number of document images among a plurality of document images which are partitioned and read, or the respective document images into a plurality of regions;

extracting line images respectively from the plurality of partitioned regions;

recognizing character images within character regions in the line images in the respective regions;

detecting an overlapping position of the plurality of document images based on character recognition results of the respective regions; and

merging the plurality of document images at the detected overlapping position.

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40. A computer-readable storage medium on which is recorded a program for causing a computer to execute a document image merging process, said process comprising:

making a display to allow a setting of whether or not to automatically merge a plurality of document images which are partitioned and read on a display screen;

partitioning an arbitrary number of document images among the plurality of document images, or the

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respective document images into a plurality of regions;

extracting line images respectively from the plurality of partitioned regions;

5 recognizing character images in character regions within the extracted line images;

detecting an overlapping position of the plurality of document images based on positions of character regions whose matching degrees are high by making a comparison between character regions in the line images in the respective regions; and

merging the plurality of document images at the detected overlapping position.

15 41. A document image processing device, comprising:

character region extracting means for extracting character regions respectively from a plurality of document images which are partitioned and read;

20 character recognizing means for recognizing character images within the character regions extracted by said character region extracting means;

overlapping detecting means for detecting an overlapping of the plurality of document images based on character recognition results of the respective

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document images, which are obtained by said character recognizing means; and

image merging means for merging the plurality of document images at an overlapping position detected
5 by said overlapping detecting means.